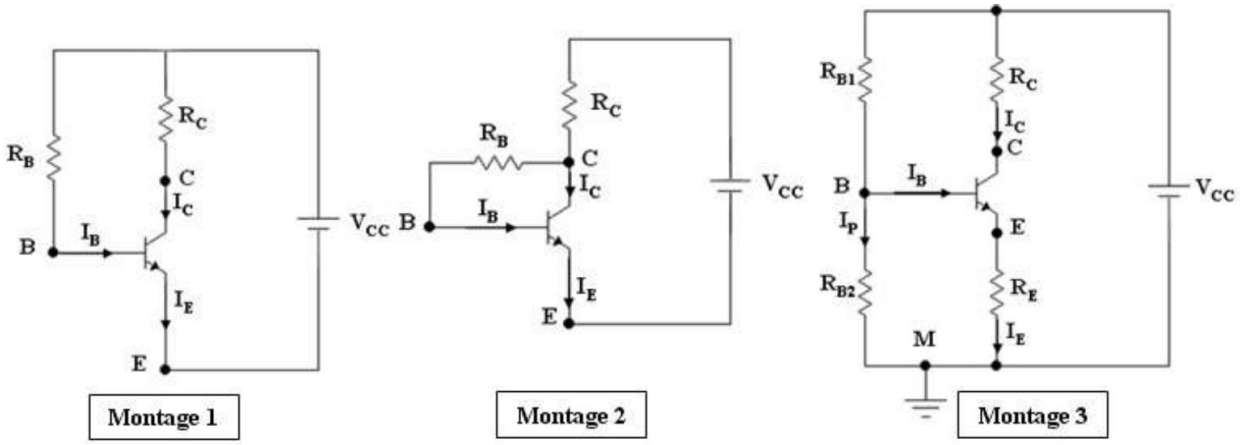
TD N° 2

Exercise 1: A silicon NPN transistor is used in the following three configurations:



1- Give the names of the polarization methods represented by these configurations.

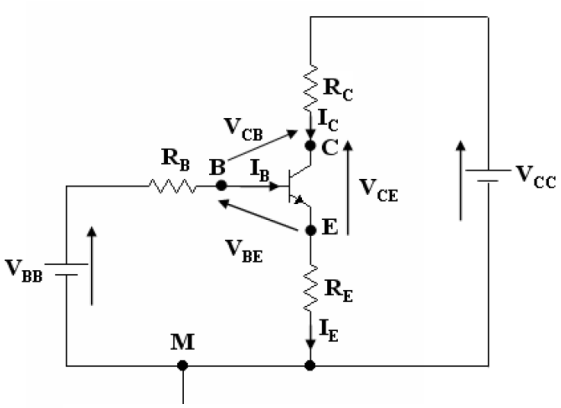
2- Calculate the required biasing components.

For each configuration, the operating point should be as follows:

$V_{CE_0} = 5\,V, I_{C_0} = 1\,mA, V_{CC} = 10\,V, \beta = 100, and\ V_{BE_0} = 0.7\,V.$

For configuration 3, take $I_p = 100\,\mu A\ and\ R_E = 1\,k\Omega.$

Exercise 2: Consider the circuit shown in the following figure:



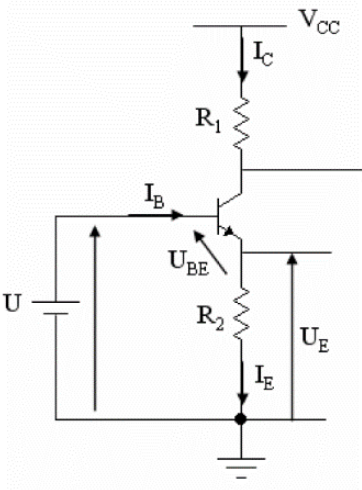
1- Calculate the quiescent points (I_B, I_C, and V_{CE}).

2- Express and plot the lines: $I_C = f(V_{CE})$ and $I_B = f(V_{BE})$.

3- Represent the quiescent points on their respective lines.

Given: $\beta = 180, V_{BB} = 5\,V,\ V_{CC} = 10\,V, V_{BE} = 0.6\,V,\ R_B = 10\,k\Omega, and\ R_C = R_E = 100\,\Omega.$

Exercise 3: Consider the following circuit with an NPN transistor having a current gain β = 200 and a base-emitter voltage $V_{BE} = 0.7\,V.$



1- Calculate the currents I_B, I_E, and I_C.

2- Calculate the voltages U_E and U_C.

3- Determine the collector-emitter voltage U_{CE}.

4- Calculate the collector-base voltage U_{CB}.

Given values: $U = 3.4\,V, R_1 = 4.7\,k\Omega, R_2 = 2.7\,k\Omega, and\ V_{CC} = 10\,V.$